

Theories, Methods and Testbeds for Curation and Preservation of Digital Art

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Abstract

This paper presents the activities and first results of a case study-based research on preservation of digital art, with an overview of key challenges surrounding the creation, management and long-term accessibility of digital art and investigation of experimental testbeds to tackle these challenges. An outline of the results of the onsite visit conducted at the pioneering ZKM Media Museum is also provided. So far, the theoretical aspects of the problem of digital art preservation and curation have been examined without much grounding in experimentation, and not responding to the theoretical and methodological dilemmas posed by digital art (e.g. transience, emergence, and lack of fixity). One of the reasons for this is that research in digital art requires an experimental testbed in which to examine the implications of different preservation approaches and the impact they have on the works of art themselves. The goal of this investigation is to develop a theoretical framework against which languages and their notational systems proposed for preserving digital art can be evaluated.

Introduction

Digital art is fundamentally art produced and mediated by a computer [1]. It is an art form within the more general 'media art' category. Digital art include Internet art, software art, and computer-mediated installations as well as conceptual art, installation art, performance art, and video. The birth of digital art is in the mid-Fifties, with the first pioneers of computer art. This was followed by a period of sedimentation and further experimentation with interactivity between the mid-Eighties and mid-Nineties. From mid-Nineties onward many new emerging talents have been creating more sophisticated and innovative digital artworks that exploit the World Wide Web.

The boundaries of digital art are particularly fluid, as it merges art, science and technology to a great extent. The technological landscape in which digital art is created and used challenges its long term accessibility, the potentiality of its integrity, and the likelihood that it will retain authenticity over time. Digital objects – including digital artworks – are fragile and susceptible to technological change. We must act to keep digital art alive. Digital preservation is an ongoing activity to ensure recurring value of digital objects [2]. It aims to ensure that future users will be able to discover, retrieve, render, manipulate, interpret and use digital information in the face of constantly changing technology. It involves conservation, renewal, restoration, selection, destruction, enhancing, updating, and annotating. It is a risk management activity at all stages of the longevity pathway - translating uncertainties into manageable risks [3].

Digital and media art works have questioned traditional museological approaches to documentation and preservation

because of their ephemeral, documentary, technical, and multi-part nature. It is not feasible for the arts community to preserve over the centuries working original equipment and software. And industry has no incentive to keep producing old parts or to maintain all new equipment compatible with the older one. This paper takes a first step towards purposing a preservation framework focused on digital art forms within the context of digital art.

Instantiations and digital casualties

As Seamus Ross observed, the "first renderings of digital objects might best be referred to as an initial 'representation or instantiation' (II). The problem is: how can we record the functionality and behaviour as well as the content of that initial instantiation (II) so that we can validate subsequent instantiations? Where subsequent instantiations (SI) share precision of resemblance in content, functionality, and behaviour with the initial instantiations, the 'SIs' can be said to have the same authenticity and integrity as the 'IIs' "[4]. This notion of precision of resemblance is intended to reflect the fact that initial instantiations of digital objects and subsequent ones will not be precisely the same, but will have a degree of sameness. This degree of sameness will vary overtime - in fact in the case of digital objects it is likely to decline as the distance between the initial instantiation and each subsequent one becomes greater, although this degree of variation may be mitigated by such circumstances as for example the frequency at which the digital object is instantiated. So each time a digital work of art is instantiated, it has a greater or lesser precision of resemblance to the initial instantiated which the artist created. These subsequent instantiations represent with greater or lesser degrees of accuracy the intentionality of the artist. Whether they have greater or lesser degrees of authenticity is a separate but fundamentally important question and need to be considered in the context of, for example, the authenticity of performance [32].

Furthermore, as Richard Rinehart noted, due to lack of documentation methods and the goal to bypass traditional art world's values and practices, media art works are "becoming victims to their own volatile intent" [5].

Challenges

There are practical problems associated with documentation, access, function, context and meaning of digital art. How do we care for similar works of art, and which are the methodological challenges for curating and preserving digital art?

Key problems in this area are related to: documentation, restoration, representation and access, available expertise and knowledge, legal and financial issues. Digital art questions many of the most fundamental assumptions of the art world:

- What is it a work of art in the digital age?
- What should be retained for the future? The input, the output, the hardware?

- Which aspects of a given work can be changed and which must remain fixed for the work to retain the artist intent?
- How do you collect and preserve? Is a digital artwork as fragile as its weakest components?
- What is ownership?
- What is the context of digital art?
- What is a viewer? A human, an artificial agent? Does the work only exist in the mind of a viewer?

Some artists think their work is in a state of becoming, and they would like them to evolve as technology evolve. Some curators think that their role is to protect artists from themselves, which also generates the problem of a “curator star system” [6]. A related issue is that many curators are simultaneously active as critics and some also as artists. Furthermore, for media art to be represented and accessed, it is also necessary the expertise of highly skilled technical experts.

We no longer debate whether it is appropriate for museums to collect contemporary art [7]. But despite the visibility and the status of media and digital art, many interactive and more complex works are still underrepresented even in leading museum collections [8]. Collecting digital and media art conflicts with the notion of art museums as institutions preserving works that have withstood the test of time. Also, digital art and media art in general generated new artistic categories and have broken down established national and ethnic divisions, all of which have affected how collections are built and organized [10].

As for the viewer, one frequent refrain about media art is that it allows the viewer to become a participant and even, for many works, a producer. The artist creates the context, the platform, the set of rules by which the viewer participates and produces. But in an increasing number of cases in media art, the viewer is not only a human but also an artificial agent, a software interpreting the artist work.

Accessibility for digital art

Digital art is much less material than traditional art. But as novelist Bruce Stirling noted, “very little materiality, is very, very far from no materiality at all” [11]. The bitstream might be composed by numbers, but the device – the computer - has the conservation problems that a painting has (e.g. humidity, heat, physical damage), plus a whole set of new ones.

In the last decade much work has been done in this area, interesting research on how you document media and digital art in order to keep it accessible in the future. Some of the key projects and initiatives in this area are (in chronological order):

- EAI - Electronic Art Intermix [12]
- IMAP - Independent Media Arts Preservation [13]
- INCCA - International Network for Conservation of Contemporary Art [14]
- Variable Media Network [15]
- Matters in Media Art [16]
- Inside installation project [17]
- DOCAM - Documentation and Conservation of the Media Arts Heritage project [18].

Nevertheless, much of this work has been survey-like and yet not well-founded from either a theoretical and methodological perspective. So far, the theoretical aspects of the problem of digital art preservation and curation have been examined without much grounding particularly in experimentation, and not responding to

the theoretical and methodological dilemmas posed by digital art (e.g. transience, emergence, and lack of fixity).

Digital art as performance

Another crucial issue about digital art, is that all digital art is a performance, and more than a performance between the viewer and the object. In this particular instance, the performance that I am actually talking about is the performance of the work. Because the work in the digital artwork consists of a set of code, and for the work to become, it must be performed. Before the viewer interacts with the digital artwork, this process of becoming has to occur.

This problem isn’t actually unique to digital art. But in the digital art, it is nearly another construct. Some very groundbreaking work in the documentation of performance has been done by Richard Rinehart [5], digital media artist and director of the UC Berkeley Art Museum/Pacific Film Archive. Rinehart produced a promising theoretical approach based on a formal notation system for digital and media art creation, documentation and preservation: the Media Art Notation System (MANS). He compared media art to the performative arts, because media art works do not exist in a stable medium, and are inherently variable and computational [19]. Their preservation is thus an interpretive act. Given the similar variability of music and media arts, Rinehart considers as appropriate a mechanism like a musical score for binding the integrity of media art works apart from specific instruments.

The investigation

It is evident that digital art is a new phenomenon, that requires a new suite of methodologies. So how we might investigate the problems specifically associated with preservation of digital art?

We might take a top down approach and think about it theoretically, or take a bottom up approach and try to understand how it works. And this is the approach that I have chosen to take. That is: I am starting with the works, the curators and the creators.

So I have decided to adopt a two-step approach, described below.

Onsite visits and in-depth interviews

I have borrowed methods from anthropology and grounded theory. Ethnography has become a common feature in social studies of scientific knowledge and technology. For example, Stephen Woolgar [20] studied how scientists work talking to and watching scientists doing things together. This ethnographic practice has also been borrowed in the user requirements domain, in the so called Contextual Design approach, a team-based user-centred design process developed directly from an onsite understanding of how the user works. In my ethnographic process of observation of digital media art, I am looking at key digital art organisations and how they are collecting, curating, preserving, displaying, financing digital art. I am conducting onsite in-depth interviews, visits and observations because what I am told is often at variance with what is being done. The organisations that I am targeting for my case studies are major international collectors of digital art and its documentation. I already visited: ZKM Museum at the ZKM Centre for Art and Media (Karlshue, Germany) [21], Ars Electronica Centre - AEC, Linz, Austria [22], The Hirshhorn Museum and Sculpture Garden (Washington DC, USA) [23],

Smithsonian American Art Museum and Lunder Conservation Center (Washington DC, USA) [24], Museum of Modern Art in San Francisco - SFMOMA (USA) [25], Berkeley Art Museum - BAM (Berkeley, USA) [26]. Once I have completed visits to all the targeted centres, I am planning to conduct interviews with digital artists themselves.

Experimentation

One of the fundamental problems in the preservation of digital art is that the work of the curators tends to be *ad hoc*. It is also based upon responsiveness to unique situations and not constructed on a body of theory and practice, as other aspects of art management and restoration tend to be. This is the case, for instance, of the restoration of Jeffrey Shaw's *Virtual Museum* [27]. This should hardly surprise us, though, as digital art is a new phenomenon. So to really understand the problem associated with preserving digital art, I have concluded that some small amount of experimentation with the preservation of the digital media artwork is essential. Therefore in the second phase of my work, I intend to design a series of experiments to advance the understanding of the processes and methods by which digital art can be preserved and handled. For example to preserve digital objects, we need to be able to extract essential characteristics of the digital object from a file to decide whether approaches such as migration and emulation will work for maintaining digital objects in accessible form.

I will use the preservation environment created by HATII at the University of Glasgow for the EU-funded Planets project [28], and the one under development in the EU-funded SHAMAN project, to test methods and processes. The reason for my having chosen this approach is that from my first ethnographic study at ZKM Center for Art and Media [31] I am aware that the preservation and curation of digital art is as much an art historical curation problem, as it is an engineering problem. This is a new approach to research in this area.

Among the tools that I will use, there is the Planets Project Testbed [28], which provides a consistent and coherent evidence-base approach for the objective evaluation of different protocols, tools, services and complete preservation plans, and the SHAMAN Preservation Framework [29] [30].

A case study: the ZKM Media Museum

In the next sections I will explore briefly my experience accumulated doing an extended research visit at ZKM Centre for Art and Media in Karlsruhe, Germany.

The ZKM Center for Art and Media [31] combines under one roof media art research and production, exhibitions and events, coordination and documentation, and a public forum for discussion about art, science, politics and finance. ZKM has a rich technological environment. Within ZKM, the Media Museum [21] is the world's first and most important museum creating and handling media art, and especially interactive digital art.

The core mission is to participate and to analyse the impact of new media on society, engaging researchers, artists, curators. Since the opening in 1997 the museum organised over 100 theme-based exhibitions, such as *Control space on surveillance in our society* (2001), *Net Condition* (1999), *You_ser* (2008)r. One of the Media Museum main goals is the preservation and restoration of artworks,

such as the uncompressed conservation of data or the preservation and restoration of media installations.

Digital preservation

It is very challenging to retain the artwork as they were originally created, because soon after the creation the equipment is no longer available. This is the case, for example, of laserdisc players and two-bulb projectors, which are now out of production. There is also an evolution of visual perception, such as for example the experience of the black&white TV of the Sixties. The Media Museum is forced to respond to the change in the technological environment, and relies on laboratories such as the ZKM Laboratory for Antique Video Systems -the only such research facility in Europe - to read and convert files produced with older devices. But at the same time it is not possible to find a unique acceptable level of intervention, although the idea is always of preserving the original character of the work as far as it is possible.

In Jeffrey Shaw's *Virtual Museum* [27], for example, the original 1991 platform was on an expensive Silicon Graphics, and the artwork had originally a flat square screen. Nowadays Silicon Graphics still works with the military but they are basically out of the market, and no longer manufactures the 1991 platform.

When it was decided to migrate it, it was moved on a PC so that it would have been easier and cheaper to replace it if needed.

There were many challenges:

- The replaced screen was quite different from the original one, with a much wider screen and immersive environment. This also posed the need to create a distorted image.
- The building itself represented in the Virtual Museum needed to be updated. A 3D model of the ZKM was therefore created specifically for this. There were also modelling issues related to the content distribution in the model, and shadows were added to provide the sense of depth in space, which made the virtual environment less boring for the user. The technician that worked on the migration had to rewrite the original code to adapt it to new environments. The final result has been approved by the artist.

Physical and digital storage

When the ZKM building was renovated from a weapon factory to a cultural factory, the architect did not have the experience to build enough storage space. The ZKM Media Museum is organizing twenty exhibits a year with works on loan from other collections, which themselves require storage space. Physical storage is also needed for specific equipment of the ZKM Media Museum local collection and for the user interfaces.

The dedicated digital storage space needed for the creation of artworks is no longer a problem in terms of technological capacity. But when dealing with the preservation of a collection, this still represents an issue both digitally and physically.

Accessibility of the artworks

The Media Museum has about seven hundred square meters of exhibition spaces, which can be used up to five exhibitions in parallel. One part of this place is dedicated to the permanent collection which represents a small percentage of the museum holdings: works such as Jeffrey Shaw's *Legible cities* have been exhibited for many years. For the great majority of the other works, it depends whether they fit into the context of the specific

exhibition. Usually, after an artwork has been shown for a couple of years, if it is really important for the public it goes into the storage or in the museum archive.

The assessment of which artwork is important for the public does not follow a standard policy. Although it is more and more acting like a *kunsthalle* with its own collection, the priority for the ZKM Media Museum director remains to follow and analyse the impact of new media on society. On the other hand, the cultural social impact of digital artworks can only be measured when the artwork is on show. The aim of the Media Museum is to show artworks for at least five to ten years after their production, because in that period of time the museum staff will understand whether it will be possible to make it work and whether the public is still able to interact with the work.

First bites at digital art theory

Upon the results of my first observations in these two institutions, I also had the opportunity to taste some first bites of digital art theory. I identified some key areas related to digital art preservation, and drafted some first assertions and questions about the underlying reality that affects these areas:

- *Codification of a digital art history.* There is not a clearly defined canon for media and digital art yet. This will come with time.
- *What is the context of a digital art work.* As for any other artwork, the context of digital art is time, period, space/society. But the context of digital art is also constrained by the technology that enables its performance. Although, in many cases we don't have a 1:1 equivalence between the artwork and the technology.
- *How to curate and preserve.* Curation doesn't necessarily mean preservation, and *viceversa*. A museum could curate a work of digital art into an exhibition, without owning the work it has no obligation to preserve it.
- *How to restore digital art.* In traditional preservation policies, such as historical monument and painting restoration, the objective is to preserve the artwork itself including the changes and alterations and attachments brought by time. In my case studies I have found that this objective raises new kinds of questions when we deal with digital art. How and when can we assess the unity or the essence of a digital artwork? When are we in front of what has been described as a "ruin" [33] or a replica [34]? Is there an "age-value" [35] for digital artworks? Who prevail in the migration during the conservation process of a media artwork: the curator, the artist, the funder, the legal framework, the new technologies, the viewer?
- *Appraisal and disposal for digital art.* Which artworks should be preserved and what could be forgotten? Who has decisional power on appraisal and disposal? Is appraisal for digital art still a subjective process? Should digital artwork be disposed actively or by benign neglect?
- *Documentation standards.* A digital work of art requires tremendous amounts of documentation if it is to be maintained in accessible form, that is if we are to be able to perform it again. And the documentation should be as much as possible standardised and in a machine-readable form.

- *The space for digital art.* For any museum collecting digital art, you need as much storage space as exhibition space. For museums holding digital art collection, a double storage space is probably required, for preserving both the artworks and the necessary equipment to preserve and display them.
- *Case studies for testbeds.* Digital art collections and policies are needed as case studies to be tested and verified within digital preservation framework. The ZKM Media Museum, for example, could become a leading testing area because it holds so many digital artworks and equipments.

Conclusions

This paper has presented the activities and first results of an ongoing research project on preservation of computer-generated imagery, in which I am investigating art theory, methods and experimental applications. Digital art is after all data designed to be constructed (represented, viewed, experienced) in particular ways, whose theoretical implications need consideration. My goal is to develop a theoretical framework against which languages and their notational systems proposed for preserving digital art can be evaluated.

By presenting my approach, I expect to contribute to the work of other efforts for the conservation and preservation of digital art, and offer the community an example of a comprehensive and experimental methodology.

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